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PAT. NO.      Title

- 1 [6,868,311](#) **T** [Method and system for on-line dynamical screening of electric power system](#)
- 2 [6,826,521](#) **T** [System and methodology and adaptive, linear model predictive control based on rigorous, nonlinear process model](#)
- 3 [6,735,596](#) **T** [Computer method and user interface for decision analysis and for global system optimization](#)
- 4 [6,606,529](#) **T** [Complex scheduling method and device](#)
- 5 [6,532,453](#) **T** [Genetic programming problem solver with automatically defined stores loops and recursions](#)
- 6 [6,151,582](#) **T** [Decision support system for the management of an agile supply chain](#)
- 7 [6,138,103](#) **T** [Method for production planning in an uncertain demand environment](#)
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- 9 [5,953,707](#) **T** [Decision support system for the management of an agile supply chain](#)
- 10 [5,390,282](#) **T** [Process for problem solving using spontaneously emergent self-replicating and self-improving entities](#)
- 11 [5,343,554](#) **T** [Non-linear genetic process for data encoding and for solving problems using automatically defined functions](#)
- 12 [5,148,513](#) **T** [Non-linear genetic process for use with plural co-evolving populations](#)
- 13 [5,136,686](#) **T** [Non-linear genetic algorithms for solving problems by finding a fit composition of functions](#)

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## **1 Optimal Blade System Design of a New Concept VTOL Vehicle Uusing the Departmental Computing Grid System**

Jin Woo Park, Si Hyoong Park, In Seong Hwang, Ji Joong Moon, Youngha Yoon, Seung Jo Kim  
 November 2004 **Proceedings of the 2004 ACM/IEEE conference on Supercomputing**

Publisher: IEEE Computer Society

Full text available: [pdf\(1.01 MB\)](#) Additional Information: [full citation](#), [abstract](#)

The blade system of a new concept VTOL vehicle is designed utilizing high performance and Grid computing technologies. The VTOL vehicle called cyclocopter employs a cycloidal propulsion system to generate the propulsion and lift for VTOL maneuver. The structural design and weight minimization of the composite blade system are critically related to the efficiency of whole cyclocopter system. The structural design is carried out using a hybrid genetic algorithm-based optimization framework on the ...

## **2 Level set and PDE methods for computer graphics**

David Breen, Ron Fedkiw, Ken Museth, Stanley Osher, Guillermo Sapiro, Ross Whitaker  
 August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: [pdf\(17.07 MB\)](#) Additional Information: [full citation](#), [abstract](#)

Level set methods, an important class of partial differential equation (PDE) methods, define dynamic surfaces implicitly as the level set (iso-surface) of a sampled, evolving nD function. The course begins with preparatory material that introduces the concept of using partial differential equations to solve problems in computer graphics, geometric modeling and computer vision. This will include the structure and behavior of several different types of differential equations, e.g. the level set eq ...

## **3 A case study in the performance and scalability of optimization algorithms**

Steven J. Benson, Lois Curfman McInnes, Jorge J. Moré  
 September 2001 **ACM Transactions on Mathematical Software (TOMS)**, Volume 27 Issue 3

Publisher: ACM Press

Full text available: [pdf\(619.98 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We analyze the performance and scalability of algorithms for the solution of large optimization problems on high-performance parallel architectures. Our case study uses the

GPCG (gradient projection, conjugate gradient) algorithm for solving bound-constrained convex quadratic problems. Our implementation of the GPCG algorithm within the Toolkit for Advanced Optimization (TAO) is available for a wide range of high-performance architectures and has been tested on problems with over 2.5 million vari ...

**Keywords:** Bound-constrained, conjugate gradients, efficiency, gradient projection, high-performance architectures, scalability

**4 Automatic data layout for distributed-memory machines**



Ken Kennedy, Ulrich Kremer

July 1998 **ACM Transactions on Programming Languages and Systems (TOPLAS)**,

Volume 20 Issue 4

**Publisher:** ACM Press

Full text available: pdf(633.20 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

The goal of languages like Fortran D or High Performance Fortran (HPF) is to provide a simple yet efficient machine-independent parallel programming model. After the algorithm selection, the data layout choice is the key intellectual challenge in writing an efficient program in such languages. The performance of a data layout depends on the target compilation system, the target machine, the problem size, and the number of available processors. This makes the choice of a good layout extremel ...

**Keywords:** high performance Fortran



**5 GPGPU: general purpose computation on graphics hardware**



David Luebke, Mark Harris, Jens Krüger, Tim Purcell, Naga Govindaraju, Ian Buck, Cliff

Woolley, Aaron Lefohn

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

**Publisher:** ACM Press

Full text available: pdf(63.03 MB)

Additional Information: [full citation](#), [abstract](#)



The graphics processor (GPU) on today's commodity video cards has evolved into an extremely powerful and flexible processor. The latest graphics architectures provide tremendous memory bandwidth and computational horsepower, with fully programmable vertex and pixel processing units that support vector operations up to full IEEE floating point precision. High level languages have emerged for graphics hardware, making this computational power accessible. Architecturally, GPUs are highly parallel s ...

**6 Performance optimizations and bounds for sparse matrix-vector multiply**

Richard Vuduc, James W. Demmel, Katherine A. Yelick, Shoaib Kamil, Rajesh Nishtala, Benjamin Lee

November 2002 **Proceedings of the 2002 ACM/IEEE conference on Supercomputing**

**Publisher:** IEEE Computer Society Press

Full text available: pdf(867.35 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)



We consider performance tuning, by code and data structure reorganization, of sparse matrix-vector multiply ( $\text{SpM} \times \text{V}$ ), one of the most important computational kernels in scientific applications. This paper addresses the fundamental questions of what limits exist on such performance tuning, and how closely tuned code approaches these limits. Specifically, we develop upper and lower bounds on the performance (Mflop/s) of  $\text{SpM} \times \text{V}$  when tuned using our previously proposed register blocking ...

**7 Software pipelining showdown: optimal vs. heuristic methods in a production compiler**



John Ruttenberg, G. R. Gao, A. Stoutchinin, W. Lichtenstein  
May 1996 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 1996 conference on Programming language design and implementation PLDI '96**, Volume 31 Issue 5

Publisher: ACM Press

Full text available: [pdf\(1.43 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper is a scientific comparison of two code generation techniques with identical goals --- generation of the best possible software pipelined code for computers with instruction level parallelism. Both are variants of *modulo scheduling*, a framework for generation of software pipelines pioneered by Rau and Glaser [RaG181], but are otherwise quite dissimilar. One technique was developed at Silicon Graphics and is used in the MIPSpro compiler. This is the production compiler for SGI's s ...

**8 Performance modeling and analysis: Optimizing systems by work schedules: (a**



**stochastic approach)**

William J. Ray, Luqi, Valdis Berzins

July 2002 **Proceedings of the 3rd international workshop on Software and performance WOSP '02**

Publisher: ACM Press

Full text available: [pdf\(116.72 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Many systems have very predictable points in time where the usage of a network changes. These systems are usually characterized by shift changes where the manning and functions performed change from shift to shift. We propose a pro-active optimization approach that uses predictable indicators like manning schedules, season, mission, and other foreseeable periodic events to configure distributed object servers. Object-Oriented computing is fast becoming the de-facto standard for software developm ...

**Keywords:** and performance tuning, distributed computing, load balancing, object-oriented programming, stochastic optimization

**9 The elements of nature: interactive and realistic techniques**



Oliver Deussen, David S. Ebert, Ron Fedkiw, F. Kenton Musgrave, Przemyslaw Prusinkiewicz, Doug Roble, Jos Stam, Jerry Tessendorf  
August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: [pdf\(17.65 MB\)](#) Additional Information: [full citation](#), [abstract](#)

This updated course on simulating natural phenomena will cover the latest research and production techniques for simulating most of the elements of nature. The presenters will provide movie production, interactive simulation, and research perspectives on the difficult task of photorealistic modeling, rendering, and animation of natural phenomena. The course offers a nice balance of the latest interactive graphics hardware-based simulation techniques and the latest physics-based simulation techni ...

**10 Adaptive call admission control for QoS/revenue optimization in CDMA cellular networks**



Christoph Lindemann, Marco Lohmann, Axel Thümmler  
July 2004 **Wireless Networks**, Volume 10 Issue 4

Publisher: Kluwer Academic Publishers

Full text available: [pdf\(969.76 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we show how online management of both quality of service (QoS) and provider revenue can be performed in CDMA cellular networks by adaptive control of

system parameters to changing traffic conditions. The key contribution is the introduction of a novel call admission control and bandwidth degradation scheme for real-time traffic as well as the development of a Markov model for the admission controller. This Markov model incorporates important features of 3G cellular networks, such ...

**Keywords:** admission control, network management and control, quality of service, queueing/performance evaluation

**11 Distributing a chemical process optimization application over a gigabit network**

 Robert L. Clay, Peter A. Steenkiste

December 1995 **Proceedings of the 1995 ACM/IEEE conference on Supercomputing (CDROM) - Volume 00 Supercomputing '95**

Publisher: ACM Press, IEEE Computer Society

Full text available:  pdf(418.23 KB)

 html(2.65 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index](#)

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We evaluate the impact of a gigabit network on the implementation of a distributed chemical process optimization application. The optimization problem is formulated as a stochastic Linear Assignment Problem and was solved using the Thinking Machines CM-2 (SIMD) and the Cray C-90 (vector) computers at PSC, and the Intel iWarp (MIMD) system at CMU, connected by the Gigabit Nectar testbed. We report our experience distributing the application across this heterogeneous set of systems and present mea ...

**Keywords:** chemical process optimization, distributed computing, heterogeneous computing, gigabit networks, stochastic linear assignment problem, optimal resource allocation

**12 Estimation of distribution algorithms: Learned mutation strategies in genetic programming for evolution and adaptation of simulated snakebot**

 Ivan Tanev

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available:  pdf(1.41 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this work we propose an approach of incorporating learned mutation strategies (LMS) in genetic programming (GP) employed for evolution and adaptation of locomotion gaits of simulated snake-like robot (Snakebot). In our approach the LMS are implemented via learned probabilistic context-sensitive grammar (LPCSG). The LPCSG is derived from the originally defined context-free grammar, which usually expresses the syntax of genetic programs in canonical GP. Applying LMS implies that the probabiliti ...

**Keywords:** Snakebot, context-sensitive grammar, genetic programming, locomotion, mutation strategies

**13 Optimal wire and transistor sizing for circuits with non-tree topology**

Lieven Vandenberghe, Stephen Boyd, Abbas El Gamal

November 1997 **Proceedings of the 1997 IEEE/ACM international conference on Computer-aided design**

Publisher: IEEE Computer Society

Full text available:  pdf(380.10 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index](#)

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Conventional methods for optimal sizing of wires and transistors use linear RC circuit models and the Elmore delay as a measure of signal delay. If the RC circuit has a tree topology the sizing problem reduces to a convex optimization problem which can be solved using geometric programming. The tree topology restriction precludes the use of these methods in several sizing problems of significant importance to high-performance deep submicron design including, for example, circuits with loops of r ...

**Keywords:** optimal circuit sizing, Elmore delay, crosstalk, clock distribution networks

**14 Artificial intelligence approaches to software engineering: Using genetic algorithms and coupling measures to devise optimal integration test orders**

Lionel C. Briand, Jie Feng, Yvan Labiche

July 2002 **Proceedings of the 14th international conference on Software engineering and knowledge engineering SEKE '02**

Publisher: ACM Press

Full text available: [pdf\(94.62 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

We present here an improved strategy to devise optimal integration test orders in object-oriented systems. Our goal is to minimize the complexity of stubbing during integration testing as this has been shown to be a major source of expenditure. Our strategy to do so is based on the combined use of inter-class coupling measurement and genetic algorithms. The former is used to assess the complexity of stubs and the latter is used to minimize complex cost functions based on coupling measurement. Us ...

**Keywords:** genetic algorithms, integration order, integration testing, object-oriented software engineering

**15 CLIP: integer-programming-based optimal layout synthesis of 2D CMOS cells**

Avaneendra Gupta, John P. Hayes

July 2000 **ACM Transactions on Design Automation of Electronic Systems (TODAES),**

Volume 5 Issue 3

Publisher: ACM Press

Full text available: [pdf\(371.02 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A novel technique, CLIP, is presented for the automatic generation of optimal layouts of CMOS cells in the two-dimensional (2D) style. CLIP is based on integer-linear programming (ILP) and solves both the width and height minimization problems for 2D cells. Width minimization is formulated in a precise form that combines all factors influencing the 2D cell width—transistor placement, diffusion sharing, and vertical in ...

**Keywords:** CMOS networks, circuit clustering, diffusion sharing, integer linear programming, integer programming, layout optimization, leaf cell synthesis, module generation, transistor chains, two-dimensional layout

**16 High-level optimization via automated statistical modeling**

Eric A. Brewer

August 1995 **ACM SIGPLAN Notices , Proceedings of the fifth ACM SIGPLAN symposium on Principles and practice of parallel programming PPoPP '95, Volume 30 Issue 8**

Publisher: ACM Press

Full text available: [pdf\(1.55 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We develop the use of statistical modeling for portable high-level optimizations such as

data layout and algorithm selection. We build the models automatically from profiling information, which ensures robust and accurate models that reflect all aspects of the target platform. We use the models to select among several data layouts for an iterative PDE solver and to select among several sorting algorithms. The selection is correct more than 99% of the time on each of four platforms ...

- 17 Applications in logistics, transportation, and distribution: Waterway, shipping, and ports: iterative optimization and simulation of barge traffic on an inland waterway

Amy Bush, W. E. Biles, G. W. DePuy

December 2003 **Proceedings of the 35th conference on Winter simulation: driving innovation**

Publisher: Winter Simulation Conference

Full text available:  pdf(299.89 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper describes an iterative technique between optimization and simulation models used to determine solutions to optimization problems and ensure that the solutions are feasible for real world operations (in terms of a simulation model). The technique allows for the development of separate optimization and simulation models with varying levels of detail in each model. The results and parameters of the optimization model are used as input to the simulation model. The performance measures ...

- 18 A performance evaluation of optimal hybrid cache coherency protocols

 Jack E. Veenstra, Robert J. Fowler

September 1992 **ACM SIGPLAN Notices , Proceedings of the fifth international conference on Architectural support for programming languages and operating systems ASPLOS-V**, Volume 27 Issue 9

Publisher: ACM Press

Full text available:  pdf(1.28 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

- 19 Parallel multigrid solver for 3D unstructured finite element problems

 Mark Adams, James W. Demmel

January 1999 **Proceedings of the 1999 ACM/IEEE conference on Supercomputing (CDROM)**

Publisher: ACM Press

Full text available:  pdf(803.64 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** parallel maximal independent sets, parallel sparse solvers, unstructured multigrid

- 20 Evolutionary performance-oriented development of parallel programs by composition of components

 Nasim Mahmood, Yusheng Feng, James C. Browne

July 2005 **Proceedings of the 5th international workshop on Software and performance WOSP '05**

Publisher: ACM Press

Full text available:  pdf(182.22 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper describes a method for evolutionary component-based development of families of parallel programs to attain performance goals on multiple execution environments for multiple family instances and an implementation of the method. It is based upon combining component-oriented development with integration of parallel/distributed execution and parallel/distributed simulation. Each component may have multiple

representations at multiple levels of realization from analytical timing models to ...

**Keywords:** component-oriented development, parallel programming, parallel/distributed simulation, performance modeling

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## 21 Optimizing memory system performance for communication in parallel computers

T. Stricker, T. Gross

May 1995 **ACM SIGARCH Computer Architecture News**, Proceedings of the 22nd annual international symposium on Computer architecture ISCA '95, Volume 23 Issue 2

Publisher: ACM Press

Full text available: [pdf\(1.47 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Communication in a parallel system frequently involves moving data from the memory of one node to the memory of another; this is the standard communication model employed in message passing systems. Depending on the application, we observe a variety of patterns as part of communication steps, e.g., regular (i.e. blocks of data), strided, or irregular (indexed) memory accesses. The effective speed of these communication steps is determined by the network bandwidth and the memory bandwidth, ...

## 22 An interface optimization and application for the numerical solution of optimal control problems

Matthias Heinkenschloss, Luís N. Vicente

June 1999 **ACM Transactions on Mathematical Software (TOMS)**, Volume 25 Issue 2

Publisher: ACM Press

Full text available: [pdf\(220.96 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

An interface between the application problem and the nonlinear optimization algorithm is proposed for the numerical solution of distributed optimal control problems. By using this interface, numerical optimization algorithms can be designed to take advantage of inherent problem features like the splitting of the variables into states and controls and the scaling inherited from the functional scalar products. Further, the interface allows the optimization algorithm to make efficient use of u ...

**Keywords:** optimal control, optimization, simulation

## 23 An efficient, exact, and generic quadratic programming solver for geometric optimization

Bernd Gärtner, Sven Schönherr

May 2000 **Proceedings of the sixteenth annual symposium on Computational geometry**

Publisher: ACM Press

Full text available:  pdf(824.59 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



**24 Minerva: An automated resource provisioning tool for large-scale storage systems**

 Guillermo A. Alvarez, Elizabeth Borowsky, Susie Go, Theodore H. Romer, Ralph Becker-Szency, Richard Golding, Arif Merchant, Mirjana Spasojevic, Alistair Veitch, John Wilkes  
November 2001 **ACM Transactions on Computer Systems (TOCS)**, Volume 19 Issue 4

Publisher: ACM Press

Full text available:  pdf(701.98 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Enterprise-scale storage systems, which can contain hundreds of host computers and storage devices and up to tens of thousands of disks and logical volumes, are difficult to design. The volume of choices that need to be made is massive, and many choices have unforeseen interactions. Storage system design is tedious and complicated to do by hand, usually leading to solutions that are grossly over-provisioned, substantially under-performing or, in the worst case, both. To solve the configuration ni ...

**Keywords:** Disk array, RAID, automatic design



**25 Book reviews**

 Karen Sutherland

June 2001 **intelligence**, Volume 12 Issue 2

Publisher: ACM Press

Full text available:  pdf(358.84 KB)  html(41.71 KB) Additional Information: [full citation](#), [references](#), [index terms](#)



**26 Automatic data layout for high performance Fortran**

 Ken Kennedy, Ulrich Kremer

December 1995 **Proceedings of the 1995 ACM/IEEE conference on Supercomputing (CDROM) - Volume 00 Supercomputing '95**

Publisher: ACM Press, IEEE Computer Society

Full text available:  pdf(316.54 KB)  html(3.63 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)  
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High Performance Fortran (HPF) is rapidly gaining acceptance as a language for parallel programming. The goal of HPF is to provide a simple yet efficient machine independent parallel programming model. Besides the algorithm selection, the data layout choice is the key intellectual step in writing an efficient HPF program. The developers of HPF did not believe that data layouts can be determined automatically in all cases, Therefore HPF requires the user to specify the data layout. It is the task ...



**27 Salinas: a scalable software for high-performance structural and solid mechanics simulations**

Manoj Bhardwaj, Kendall Pierson, Garth Reese, Tim Walsh, David Day, Ken Alvin, James Peery, Charbel Farhat, Michel Lesoinne

November 2002 **Proceedings of the 2002 ACM/IEEE conference on Supercomputing**

Publisher: IEEE Computer Society Press

Full text available:  pdf(1.63 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present Salinas, a scalable implicit software application for the finite element static and dynamic analysis of complex structural real-world systems. This relatively complete engineering software with more than 100,000 lines of C++ code and a long list of users sustains 292.5 Gflop/s on 2,940 ASCI Red processors, and 1.16 Tflop/s on 3,375 ASCI White processors.

**28 Dynamic feedback: an effective technique for adaptive computing** 

 Pedro C. Diniz, Martin C. Rinard

May 1997 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 1997 conference on Programming language design and implementation PLDI '97**, Volume 32 Issue 5

Publisher: ACM Press

Full text available:  pdf(1.86 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper presents dynamic feedback, a technique that enables computations to adapt dynamically to different execution environments. A compiler that uses dynamic feedback produces several different versions of the same source code; each version uses a different optimization policy. The generated code alternately performs sampling phases and production phases. Each sampling phase measures the overhead of each version in the current environment. Each production phase uses the version with the lea ...

**29 An optimal memory allocation scheme for scratch-pad-based embedded systems** 

 Oren Avissar, Rajeev Barua, Dave Stewart

November 2002 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 1 Issue 1

Publisher: ACM Press

Full text available:  pdf(396.62 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This article presents a technique for the efficient compiler management of software-exposed heterogeneous memory. In many lower-end embedded chips, often used in microcontrollers and DSP processors, heterogeneous memory units such as scratch-pad SRAM, internal DRAM, external DRAM, and ROM are visible directly to the software, without automatic management by a hardware caching mechanism. Instead, the memory units are mapped to different portions of the address space. Caches are avoided due to the ...

**Keywords:** Memory, allocation, embedded, heterogeneous, storage

**30 A Geometric Programming Framework for Optimal Multi-Level Tiling** 

Lakshminarayanan Renganarayana, Sanjay Rajopadhye

November 2004 **Proceedings of the 2004 ACM/IEEE conference on Supercomputing**

Publisher: IEEE Computer Society

Full text available:  pdf(517.47 KB) Additional Information: [full citation](#), [abstract](#)

Determining the optimal tile size—one that minimizes the execution time—is a classical problem in compilation and performance tuning of loop kernels. Designing a model of the overall execution time of a tiled loop nest is an important subproblem. Both problems become harder when tiling is applied at multiple levels. We present a framework for determining the optimal tile sizes for a fully permutable, perfectly nested, rectangular loop with uniform dependences. Our framework supports multiple lev ...

**31 Parallel Newton-Krylov methods for PDE-constrained optimization** 

George Biros, Omar Ghattas

 January 1999 **Proceedings of the 1999 ACM/IEEE conference on Supercomputing (CDROM)**

Publisher: ACM Press

Full text available:  pdf(107.20 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



**32 Technology mapping, buffering, and bus design: Synthesizing optimal filters for crosstalk-cancellation for high-speed buses**

 Jihong Ren, Mark Greenstreet

June 2003 **Proceedings of the 40th conference on Design automation**

Publisher: ACM Press

Full text available:  pdf(228.84 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present practical algorithms for the synthesis of crosstalk cancelling equalizing filters. We examine designs optimized for the traditional  $L_2$  metric and introduce an approach based on the  $L_\infty$  metric. We compare the two approaches for realistic buses with tight wire spacings. We show bandwidth improvements of up to a factor of 2 using crosstalk cancellation when compared with no filtering or independent pre-emphasis for each wire. Using  $L_\infty$  optimization, we achi ...

**Keywords:** buses, crosstalk, equalizing filters, optimal synthesis



**33 Eliminating synchronization overhead in automatically parallelized programs using dynamic feedback**

 Pedro C. Diniz, Martin C. Rinard

May 1999 **ACM Transactions on Computer Systems (TOCS)**, Volume 17 Issue 2

Publisher: ACM Press

Full text available:  pdf(244.57 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

This article presents dynamic feedback, a technique that enables computations to adapt dynamically to different execution environments. A compiler that uses dynamic feedback produces several different versions of the same source code; each version uses a different optimization policy. The generated code alternately performs sampling phases and production phases. Each sampling phase measures the overhead of each version in the current environment. Each production phase uses the version with ...

**Keywords:** parallel computing, parallelizing compilers



**34 Collision detection and proximity queries**

 Sunil Hadap, Dave Eberle, Pascal Volino, Ming C. Lin, Stephane Redon, Christer Ericson

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available:  pdf(11.22 MB) Additional Information: [full citation](#), [abstract](#)

This course will primarily cover widely accepted and proved methodologies in collision detection. In addition more advanced or recent topics such as continuous collision detection, ADFs, and using graphics hardware will be introduced. When appropriate the methods discussed will be tied to familiar applications such as rigid body and cloth simulation, and will be compared. The course is a good overview for those developing applications in physically based modeling, VR, haptics, and robotics.

**35 Intraprogram dynamic voltage scaling: Bounding opportunities with analytic modeling** 

Fen Xie, Margaret Martonosi, Sharad Malik

September 2004 **ACM Transactions on Architecture and Code Optimization (TACO)**,  
Volume 1 Issue 3

Publisher: ACM Press

Full text available:  pdf(980.11 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Dynamic voltage scaling (DVS) has become an important dynamic power-management technique to save energy. DVS tunes the power-performance tradeoff to the needs of the application. The goal is to minimize energy consumption while meeting performance needs. Since CPU power consumption is strongly dependent on the supply voltage, DVS exploits the ability to control the power consumption by varying a processor's supply voltage and clock frequency. However, because of the energy and time overhead asso ...

**Keywords:** Analytical model, compiler, dynamic voltage scaling, low power, mixed-integer linear programming

**36 Prioritization Methods for Accelerating MDP Solvers** 

David Wingate, Kevin D. Seppi

September 2005 **The Journal of Machine Learning Research**, Volume 6

Publisher: MIT Press

Full text available:  pdf(542.57 KB) Additional Information: [full citation](#), [abstract](#)

The performance of value and policy iteration can be dramatically improved by eliminating redundant or useless backups, and by backing up states in the right order. We study several methods designed to accelerate these iterative solvers, including prioritization, partitioning, and variable reordering. We generate a family of algorithms by combining several of the methods discussed, and present extensive empirical evidence demonstrating that performance can improve by several orders of magnitude ...

**37 Constraints-driven scheduling and resource assignment** 

Krzysztof Kuchcinski

July 2003 **ACM Transactions on Design Automation of Electronic Systems (TODAES)**,  
Volume 8 Issue 3

Publisher: ACM Press

Full text available:  pdf(361.41 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes a new method for modeling and solving different scheduling and resource assignment problems that are common in high-level synthesis (HLS) and system-level synthesis. It addresses assignment of resources for operations and tasks as well as their static, off-line scheduling. Different heterogeneous constraints are considered for these problems. These constraints can be grouped into two classes: problem-specific constraints and design-oriented constraints. They are uniformly mo ...

**Keywords:** Constraint programming, high-level synthesis, resource assignment, scheduling, system-level synthesis

**38 Real-time shading** 

Marc Olano, Kurt Akeley, John C. Hart, Wolfgang Heidrich, Michael McCool, Jason L. Mitchell, Randi Rost

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available:  pdf(7.39 MB) Additional Information: [full citation](#), [abstract](#)

Real-time procedural shading was once seen as a distant dream. When the first version of this course was offered four years ago, real-time shading was possible, but only with one-of-a-kind hardware or by combining the effects of tens to hundreds of rendering passes. Today, almost every new computer comes with graphics hardware capable of interactively executing shaders of thousands to tens of thousands of instructions. This course has been redesigned to address today's real-time shading capabili ...

**39 Application specific processors: Balancing design options with Sherpa**



Timothy Sherwood, Mark Oskin, Brad Calder

September 2004 **Proceedings of the 2004 international conference on Compilers, architecture, and synthesis for embedded systems**

Publisher: ACM Press

Full text available: [pdf\(292.03 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Application specific processors offer the potential of rapidly designed logic specifically constructed to meet the performance and area demands of the task at hand. Recently, there have been several major projects that attempt to automate the process of transforming a predetermined processor configuration into a low level description for fabrication. These projects either leave the specification of the processor to the designer, which can be a significant engineering burden, or handle it in a fu ...

**Keywords:** application specific processor (ASIP), area minimization, computer architecture, design space exploration, peicewise linear model

**40 Technical reports**



SIGACT News Staff

January 1980 **ACM SIGACT News**, Volume 12 Issue 1

Publisher: ACM Press

Full text available: [pdf\(5.28 MB\)](#) Additional Information: [full citation](#)

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#### 41 [Papers: distributed constraint processing: Impact of problem centralization in distributed constraint optimization algorithms](#)

John Davin, Pragnesh Jay Modi

July 2005 **Proceedings of the fourth international joint conference on Autonomous agents and multiagent systems AAMAS '05**

Publisher: ACM Press

Full text available: [pdf\(438.04 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Recent progress in Distributed Constraint Optimization Problems (DCOP) has led to a range of algorithms now available which differ in their amount of problem centralization. Problem centralization can have a significant impact on the amount of computation required by an agent but unfortunately the dominant evaluation metric of "number of cycles" fails to account for this cost. We analyze the relative performance of two recent algorithms for DCOP: OptAPO, which performs partial centralization, an ...

**Keywords:** constraint satisfaction/optimization

#### 42 [Reconciling responsiveness with performance in pure object-oriented languages](#)

Urs Hözle, David Ungar

July 1996 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 18 Issue 4

Publisher: ACM Press

Full text available: [pdf\(537.19 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Dynamically dispatched calls often limit the performance of object-oriented programs, since object-oriented programming encourages factoring code into small, reusable units, thereby increasing the frequency of these expensive operations. Frequent calls not only slow down execution with the dispatch overhead per se, but more importantly they hinder optimization by limiting the range and effectiveness of standard global optimizations. In particular, dynamically dispatched callees prevent stand ...

**Keywords:** adaptive optimization, pause clustering, profile-based optimization, run-time compilation, type feedback

#### 43 [Coping with network failures: routing strategies for optimal demand oblivious](#)

 restoration

David Applegate, Lee Breslau, Edith Cohen

June 2004 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the joint international conference on Measurement and modeling of computer systems SIGMETRICS 2004/PERFORMANCE 2004**, Volume 32 Issue 1

Publisher: ACM Press

Full text available:  pdf(234.02 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Link and node failures in IP networks pose a challenge for network control algorithms. Routing restoration, which computes new routes that avoid failed links, involves fundamental tradeoffs between efficient use of network resources, complexity of the restoration strategy and disruption to network traffic. In order to achieve a balance between these goals, obtaining routings that provide good performance guarantees under failures is desirable. In this paper, building on previous work that provide ...

**Keywords:** demand-oblivious routing, restoration, routing

**44 Monitoring and measurements: Optimal positioning of active and passive monitoring devices**

 Claude Chaudet, Eric Fleury, Isabelle Guérin Lassous, Hervé Rivano, Marie-Emilie Voge  
October 2005 **Proceedings of the 2005 ACM conference on Emerging network experiment and technology CoNEXT'05**

Publisher: ACM Press

Full text available:  pdf(783.63 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Network measurement is essential for assessing performance issues, identifying and locating problems. Two common strategies are the passive approach that attaches specific devices to links in order to monitor the traffic that passes through the network and the active approach that generates explicit control packets in the network for measurements. One of the key issues in this domain is to minimize the overhead in terms of hardware, software, maintenance cost and additional traffic. In this paper ...

**Keywords:** active monitoring, optimization, passive monitoring

**45 Optimal spilling for CISC machines with few registers**

 Andrew W. Appel, Lal George

May 2001 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 2001 conference on Programming language design and implementation PLDI '01**, Volume 36 Issue 5

Publisher: ACM Press

Full text available:  pdf(1.31 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Many graph-coloring register-allocation algorithms don't work well for machines with few registers. Heuristics for live-range splitting are complex or suboptimal; heuristics for register assignment rarely factor the presence of fancy addressing modes; these problems are more severe the fewer registers there are to work with. We show how to optimally split live ranges and optimally use addressing modes, where the optimality condition measures dynamically weighted loads and stores but not regis ...

**46 Large-scale circuit placement**

 Jason Cong, Joseph R. Shinnerl, Min Xie, Tim Kong, Xin Yuan

April 2005 **ACM Transactions on Design Automation of Electronic Systems (TODAES)**, Volume 10 Issue 2

Publisher: ACM Press

Full text available:  pdf(428.15 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Placement is one of the most important steps in the RTL-to-GDSII synthesis process, as it directly defines the interconnects, which have become the bottleneck in circuit and system performance in deep submicron technologies. The placement problem has been studied extensively in the past 30 years. However, recent studies show that existing placement solutions are surprisingly far from optimal. The first part of this tutorial summarizes results from recent optimality and scalability studies of exi ...

**Keywords:** Placement, large-scale optimization, optimality, scalability

**47 Compile-time dynamic voltage scaling settings: opportunities and limits** 

 Fen Xie, Margaret Martonosi, Sharad Malik

May 2003 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 2003 conference on Programming language design and implementation PLDI '03**, Volume 38 Issue 5

Publisher: ACM Press

Full text available:  pdf(291.26 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

With power-related concerns becoming dominant aspects of hardware and software design, significant research effort has been devoted towards system power minimization. Among run-time power-management techniques, dynamic voltage scaling (DVS) has emerged as an important approach, with the ability to provide significant power savings. DVS exploits the ability to control the power consumption by varying a processor's supply voltage (V) and clock frequency (f). DVS controls energy by scheduling diffe ...

**Keywords:** analytical model, compiler, dynamic voltage scaling, low power, mixed-integer linear programming

**48 Efficient decomposition and performance of parallel PDE, FFT, Monte Carlo simulations, simplex, and sparse solvers** 

Zarka Cvetanovic, Edward G. Freedman, Charles Nofsinger

November 1990 **Proceedings of the 1990 ACM/IEEE conference on Supercomputing**

Publisher: IEEE Computer Society

Full text available:  pdf(1.07 MB) Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper, we describe the decomposition of six algorithms: two Partial Differential Equations (PDE) solvers (*Successive Over-Relaxation* (SOR) and *Alternating Direction Implicit* (ADI)), Fast Fourier Transform (FFT), Monte Carlo simulations, Simplex linear programming, and Sparse solvers. The algorithms were selected not only because of their importance in scientific applications, but also because they represent a variety of computational (structured to irregular) and communicat ...

**49 Policy optimization for dynamic power management** 

 G. A. Paleologo, L. Benini, A. Bogliolo, G. De Micheli

May 1998 **Proceedings of the 35th annual conference on Design automation**

Publisher: ACM Press

Full text available:  pdf(239.25 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

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Dynamic power management schemes (also called policies) can be used to control the power consumption levels of electronic systems, by setting their components in different states, each characterized by a performance level and a power consumption. In this paper, we describe power-managed systems using a finite-state, stochastic model. Furthermore,

we show that the fundamental problem of finding an optimal policy which maximizes the average performance level of a system, subject to a ...

**Keywords:** emulation, functional simulation, reconstruction, visibility

**50 Improving cache performance in dynamic applications through data and computation reorganization at run time**

 Chen Ding, Ken Kennedy

May 1999 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 1999 conference on Programming language design and implementation PLDI '99**, Volume 34 Issue 5

Publisher: ACM Press

Full text available:  pdf(1.54 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

With the rapid improvement of processor speed, performance of the memory hierarchy has become the principal bottleneck for most applications. A number of compiler transformations have been developed to improve data reuse in cache and registers, thus reducing the total number of direct memory accesses in a program. Until now, however, most data reuse transformations have been *static*--applied only at compile time. As a result, these transformations cannot be used to optimize irregular and ...

**51 Performance evaluation of the Orca shared-object system**

 Henri E. Bal, Raoul Bhoedjang, Rutger Hofman, Ceriel Jacobs, Koen Langendoen, Tim Rühl, M. Frans Kaashoek

February 1998 **ACM Transactions on Computer Systems (TOCS)**, Volume 16 Issue 1

Publisher: ACM Press

Full text available:  pdf(179.39 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Orca is a portable, object-based distributed shared memory (DSM) system. This article studies and evaluates the design choices made in the Orca system and compares Orca with other DSMs. The article gives a quantitative analysis of Orca's coherence protocol (based on write-updates with function shipping), the totally ordered group communication protocol, the strategy for object placement, and the all-software, user-space architecture. Performance measurements for 10 parallel applications ill ...

**Keywords:** distributed shared memory, parallel processing, portability

**52 Fast detection of communication patterns in distributed executions**

Thomas Kunz, Michiel F. H. Seuren

November 1997 **Proceedings of the 1997 conference of the Centre for Advanced Studies on Collaborative research**

Publisher: IBM Press

Full text available:  pdf(4.21 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Understanding distributed applications is a tedious and difficult task. Visualizations based on process-time diagrams are often used to obtain a better understanding of the execution of the application. The visualization tool we use is Poet, an event tracer developed at the University of Waterloo. However, these diagrams are often very complex and do not provide the user with the desired overview of the application. In our experience, such tools display repeated occurrences of non-trivial commun ...

**53 GloptiPoly: Global optimization over polynomials with Matlab and SeDuMi**

Didier Henrion, Jean-Bernard Lasserre

June 2003 **ACM Transactions on Mathematical Software (TOMS)**, Volume 29 Issue 2

Publisher: ACM Press

Full text available: [pdf\(1.04 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

GloptiPoly is a Matlab/Sedumi add-on to build and solve convex linear matrix inequality relaxations of the (generally nonconvex) global optimization problem of minimizing a multivariable polynomial function subject to polynomial inequality, equality, or integer constraints. It generates a series of lower bounds monotonically converging to the global optimum without any problem splitting. Global optimality is detected and isolated optimal solutions are extracted automatically. Numerical experimen ...

**Keywords:** Matlab, Polynomial programming, Sedumi, linear matrix inequality, semidefinite programming

54 [Evolutionary multiobjective optimization: Minimizing total flowtime and maximum earliness on a single machine using multiple measures of fitness](#)

Mary E. Kurz, Sarah Canterbury

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available: [pdf\(246.79 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The intent of this research is to investigate methods to use genetic algorithms to find the set of efficient solutions to a bi-criteria problem. We propose a general methodology which is characterized by using different criteria upon which the decision to retain chromosomes into the next generation is made. We perform elite reproduction based on two general measures of "eliteness": non-dominated in the current population and performance measured in terms of each criterion individually. We invest ...

**Keywords:** bi-criteria scheduling, multicriteria genetic algorithm

55 [Optimizing locality for ODE solvers](#)

Thomas Rauber, Gudula Rüger

June 2001 **Proceedings of the 15th international conference on Supercomputing**

Publisher: ACM Press

Full text available: [pdf\(362.00 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Runge-Kutta methods are popular methods for the solution of systems of ordinary differential equations and are provided by many scientific libraries. The performance of Runge-Kutta methods does not only depend on the specific application problem to be solved but also on the characteristics of the target machine. For processors with memory hierarchy, the locality of data referencing pattern has a large impact on the efficiency of a program. In this paper, we describe program transformations fo ...

56 [Learning the Kernel Matrix with Semidefinite Programming](#)

Gert R. G. Lanckriet, Nello Cristianini, Peter Bartlett, Laurent El Ghaoui, Michael I. Jordan  
December 2004 **The Journal of Machine Learning Research**, Volume 5

Publisher: MIT Press

Full text available: [pdf\(467.50 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

Kernel-based learning algorithms work by embedding the data into a Euclidean space, and then searching for linear relations among the embedded data points. The embedding is performed implicitly, by specifying the inner products between each pair of points in the embedding space. This information is contained in the so-called kernel matrix, a

symmetric and positive semidefinite matrix that encodes the relative positions of all points. Specifying this matrix amounts to specifying the geometry of t ...

### **57 Stream query processing I: Approximate join processing over data streams**

 Abhinandan Das, Johannes Gehrke, Mirek Riedewald

June 2003 **Proceedings of the 2003 ACM SIGMOD international conference on Management of data**

Publisher: ACM Press

Full text available:  pdf(282.87 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We consider the problem of approximating sliding window joins over data streams in a data stream processing system with limited resources. In our model, we deal with resource constraints by shedding load in the form of dropping tuples from the data streams. We first discuss alternate architectural models for data stream join processing, and we survey suitable measures for the quality of an approximation of a set-valued query result. We then consider the number of generated result tuples as the q ...

### **58 Performance estimation of embedded software with instruction cache modeling**

 Yau-Tsun Steven Li, Sharad Malik, Andrew Wolfe

July 1999 **ACM Transactions on Design Automation of Electronic Systems (TODAES)**, Volume 4 Issue 3

Publisher: ACM Press

Full text available:  pdf(171.05 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Embedded systems generally interact in some way with the outside world. This may involve measuring sensors and controlling actuators, communicating with other systems, or interacting with users. These functions impose real-time constraints on system design. Verification of these specifications requires computing an upper bound on the worst-case execution time (WCET) of a hardware/software system. Furthermore, it is critical to derive a tight upper bound on WCET in order to make efficient u ...

### **59 Papers: Managing user interaction: A modular geometric constraint solver for user interface applications**

 Hiroshi Hosobe

November 2001 **Proceedings of the 14th annual ACM symposium on User interface software and technology**

Publisher: ACM Press

Full text available:  pdf(901.45 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Constraints have been playing an important role in the user interface field since its infancy. A prime use of constraints in this field is to automatically maintain geometric layouts of graphical objects. To facilitate the construction of constraint-based user interface applications, researchers have proposed various constraint satisfaction methods and constraint solvers. Most previous research has focused on either local propagation or linear constraints, excluding more general nonlinear ones. ...

**Keywords:** constraint solvers, geometric constraints, graph layouts, module mechanisms, soft constraints

### **60 Modeling and optimizing run-time reconfiguration using evolutionary computation**

 J. Harkin, T. M. McGinnity, L. P. Maguire

November 2004 **ACM Transactions on Embedded Computing Systems (TECS)**, Volume 3 Issue 4

Publisher: ACM Press

Full text available:  [pdf\(506.52 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The hardware--software (HW--SW) partitioning of applications to dynamically reconfigurable embedded systems allows for customization of their hardware resources during run-time to meet the demands of executing applications. The run-time reconfiguration (RTR) of such systems can have an impact on the HW--SW partitioning strategy and the system performance. It is therefore important to consider approaches to optimally reduce the RTR overhead during the HW-SW partitioning stage. In order to exa ...

**Keywords:** Evolutionary computing, FPGAs, partitioning, run-time reconfiguration

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Moreover, Evolver can **optimize** virtually any spreadsheet model — even those ...

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We are interested in using computing time as a **performance measure**; although, the ideas below can be used with other measures. For each problem p and **solver** ...

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the domain-wise parallel multifrontal **solver**, a direct solution method characterized by the ... Figure 11 shows the evolution of **fitness measure** with re- ...  
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computing time as a **performance measure**; although, the ideas below can be used ... of being the **optimal solver**) and that the probability that LOQO is the ...

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We present a combinatorial framework for de- veloping **optimal** composite ...

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peak MFLOPS = MFLOPS for some **optimal** instruction stream. ... Total running time  
is the ultimate **performance measure**. CS 347 S'98 ...

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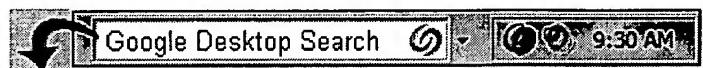
If Syn.Target is below the **optimal** value,, **optimal** synthesis is performed.

If no target is given the default value is the. open-loop h-inf norm. Syn.Solver ...

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result in large changes to the objective function or **fitness measure**. ... hard to specify what kinds of solutions a problem-solver should produce and hard ...

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Table 2 shows the number of catastrophic failures, locally inconsistent problems and local **optimal** solutions for each **solver**. In the context of evaluating ...

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Other starting points may lead to an **optimal** solution, but it is not possible to

... The **solver** advises at this point to use a better starting solution. ...

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POVM elements. As we will show in Section 5, the **optimal** design can be obtained by solving a convex optimization problem. The **performance measure**.  $\mathbb{R}^{\infty \times \emptyset}$  ...

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The quantitative **performance measure**, to be minimized, involves the time ...

In order to speed up the search for an **optimal** schedule (in particular in order ...

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Thus, the problem **solver** is concerned with finding and manipulating at most four pieces ... **optimize** models' fit to data where the fit consists of a large ...

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can be used to get arbitrary close to the **optimal** solution. ... first upper-bounding the **performance measure**, then selection ...

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sequence need to be developed to **optimize** a given **performance measure** ...

to the **optimal** solutions obtained from GAMS/CPLEX **solver**. This comparison also ...

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A Lyapunov **solver**, modelled after the Matlab function lyap.m, ... of the transfer function from the disturbance to the **performance measure z** actually ...

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(4PTS) Which of the constraints are binding AND nonbinding at the **optimal** solution for the following problem and **Solver** output? ...

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apply the objective function as an abstract **fitness measure** - the higher the ...  
an optimum, it is rather "approximating", by approaching **optimal** values ...

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To determine the **optimal** control inputs we associate a **performance measure** to  
the above dynamical model and formulate Hamilton-Jacobi (HJ) equations that ...  
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[Conditional Value-at-Risk: Optimization Algorithms and ...](#)

Value-at-Risk (VaR), a widely used **performance measure**, answers the question:  
what is ... If constraint (5) is active, then the **optimal** value  $a^*$  equals VaR. ...

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... of equations and inequalities, and/or (b) **optimize** some **performance measure**.

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**optimal** instruction stream can be meaningless. Example: ... 60 secs. 90 secs.

60 secs. Total running time is the ultimate **performance measure**. ...

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(4PTS) Which of the constraints are binding at the **optimal** solution for the  
following problem and **Solver** output? ANSWER:  $X_1 = 6$ ,  $X_2 = 4$  ...

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near real-time **solver** is required. R. EFERENCES. [1] AE Bryson and YC Ho, Applied  
Optimal Control. New York: Wiley, 1995. ...

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From our experience, this **solver** provides accurate solutions within reasonable  
... Together, these two techniques are used to find the near-optimal global ...

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The **performance measure**- ments guide us in (choosing the rank of the update to use in. t.he waveform **solver** and indicate how sensitive the per- ...  
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**Project-Team-MACSI**

... of the IMP in terms of a **performance measure** and confirm its usefulness. ...

We develop an **optimal** branch and bound procedure to solve the m-machine ...

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